~~A~~ chp 12.

a 9] If Einstein's 2^{nd} postulate is correct, then the speed should be 'c'. (and the train travels in a vacuum)

15) The astronomer could calculate time of travel for the light by dividing the distance to each galaxy by 'c'. The light from the more distant Whirlpool galaxy would appear to have been emitted before the light from Andromeda. However if Einstein's ~~Ist~~ postulates were accurate, then it should be possible to find an observer moving relative to this astronomer who ~~b~~ calculates that the ~~super~~ explosions did happen simultaneously.

24.) The clock on the earth would seem to run slow compared to clocks on the spaceship. The egg would overcook.

41.) If the muon is moving, its 'clock' seems to run slow compared to a clock on earth. Then, it survives for a longer period of 'earth-time', so it travels a longer ~~dist~~ earth-distance. In the rest frame of the muon, it survives for only ~~a~~ a few microseconds.

E 1] Presumably, the 'time' is measured in some rest frame near the earth's center. ~~that is not rotating with respect to the~~

Then, $t_{sun-earth} \approx \frac{d}{c} = \frac{1.5 \cdot 10^{11}\ m}{3 \cdot 10^{8}\ m/s} = 500s = 8\ min\ 20\ s$

$$t_{moon-earth} = \frac{3.84 \cdot 10^{8} m}{3 \cdot 10^{8}\ m/s} = 1.28\ s$$

11) $\gamma = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}} = \frac{1}{\sqrt{1-(.99)^2}} = \frac{1}{\sqrt{.02}} \approx 7.1$.

$t_{earth} = \gamma\, t_{astro} = (7.1)(4\ h) = \underline{28\ hours}$

15.) Since the conductor and the ruler and the train are all travelling together at the same speed, then they are all at rest relative to each other.
Then the conductor will believe that the train has the same length as before; $\underline{300\ m}$.

17.) $\gamma = \frac{1}{\sqrt{1-(.95)^2}} = 3.2$ From the text, pg 301,

'the moving length is equal to the length measured
(rocket ship)

at rest (on earth) divided by the relativistic... factor.'

$L_{ship} = \frac{L_{earth}}{\gamma} = \frac{42 \cdot 10^{12} m}{3.2} = \underline{13 \cdot 10^{12}\ m}$